

## Development, Status of Women and Demographic Outcomes in Madhya Pradesh: A Regional Analysis

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**ABSTRACT** Ever since the formulation of the demographic transition theory, several researchers have studied the linkages between development and demographic outcomes. Using data from Census of India 1991, NFHS-2 (1998-99) and CMIE (1993), this paper examines the regional variation in Madhya Pradesh in terms of socio-economic conditions, cultural traits, family welfare programme and demographic characteristics. A number of variables were considered to represent each dimension of socio-economic development, status of women and family welfare programme. An attempt has also been made to find out the relative role of socio-economic conditions, cultural traits and family welfare programmes in explaining fertility and child mortality. The result of regression analysis shows that the strength of family welfare programmes in reducing fertility is more than socio-economic development. Women residing in areas with a strong family welfare programme are likely to have lower fertility compared to those in areas with a weak programme. However, neither socio-economic development nor status of women exerts a similar influence on fertility decline. The interaction between status of women and programme strength is negative, which signifies that the effect of the programme strength tends to reduce in areas where status of women is better.

### INTRODUCTION

The demographic transition theory propelled several researchers to study the linkages between development and demographic outcomes. Generally, socio-economic development and fertility and mortality are believed to be negatively related. "When fertility declines, it does not decline uniformly in all segments of the population. The decline first appears among the more modernized and advanced segments. Therefore, the appearance of differentials in fertility by socio-economic development is a sensitive indicator of the early phase of fertility decline" (United Nations 1987). Development, according to the UN (1987) definition is "a multi-dimensional phenomenon, which includes level of economic production, education, provision of health care services, status of women, nutritional status of population, quality of housing, distribution of goods and services, transport system and access to communication network". Therefore development encompasses improvements in both social and economic environment. Empirical evidences show that the pace of demographic

transition has been different in all the countries depending upon their socio-economic levels of development and cultural factors. Some demographers viewed economic development as the best contraceptive, which is followed by marked decline in birth and death rate. On the contrary, the evidence of Cuba (where economic development followed rise in birth rate) and France (where birth rate declined even before industrialization began) signifies that the growth of population and decline in birth and death rate are basically 'area' specific.

Caldwell et al. (1982), Dyson and Moore (1983) and Malhotra et al. (1995) made some early attempts to understand the fertility and mortality differentials in India by examining the distinct cultural dimensions prevalent in the country in addition to social and economic indicators of development. There is considerable documentation that culture in India not only shows great diversity but also a distinct regional pattern. The relative role of social, economic and cultural factors in explaining fertility and mortality remains debatable as one group opines that socio-economic development acts as the main force in triggering the transition whereas others suggest that, in addition to socio-economic development, it is necessary to consider the cultural beliefs and practices to have a holistic view of the factors responsible for the transition. The way socio-economic development will affect fertility ultimately

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depends on how new ideas are internalized, which is dependent upon prevailing cultural beliefs and practices.

The level of socio-economic development apparently overlaps with dimensions of culture. It is often argued that greater sexual freedom and higher labour force participation among poor women suggest a negative relationship between class and patriarchy (Miller, 1981; Sharma and Retherford, 1990). Patriarchy is defined as the set of social institutions that favour man in the intra-familial allocation of resources and power, and deny women the opportunity to be self-supporting, thereby making them dependent upon the male relatives for survival (Mason and Taj, 1987). Others, however, find that the interaction of class and gender only means a difference in the domain rather than the degree of female oppression (Mason and Taj, 1987). Similarly, variations in the modernization theory suggests that better living standards have an egalitarian effect by providing women access to key resources such as education and employment and by altering traditional family systems (Caldwell 1982). While women in most societies gain in regard to education as a result of socio-economic development, this is not necessarily true for job access or domestic freedom (Sharma and Retherford, 1990; Sopher, 1980).

Considering the rapid growth of population as a hindrance to development, some developing countries (e.g. Bangladesh) had adopted strong family planning programmes (during the 70s and 80s) resulting in dramatic reduction in fertility and in turn improving the mortality situation. Hence, in the present context there are at least three factors, which could have relevance in exerting influence on the demographic transition. Apart from socio-economic development and cultural factors, that indirectly influence the status of women in the society, the third factor is the 'strength of the family welfare programme'. India's family planning programme (now family welfare programme) despite being the oldest in the world has not succeeded in promoting and popularizing the small family norm as desired. The favourable demographic condition in Kerala and Goa are believed to be the outcomes of social development rather than the strength of the family welfare programme. However the recent decline of fertility in Andhra Pradesh and Tamil Nadu, where the family welfare programme is quite strong and socio-economic development is yet

to reach noticeable levels, suggests that the family welfare programme independently, to a certain extent, can reduce fertility. None of the studies mentioned earlier, have included any variable to take care of the strength of family welfare programme. Also, Dyson and Moore opined that the reason behind higher female autonomy in the south is because of intensive rice cultivation, which is more female labour oriented. The specific role of this factor on fertility needs investigation since there are also other areas in the country where rice is a major crop.

With such a theoretical perspective, the basic aim of the present paper is to investigate the relative role of these three factors in influencing fertility and mortality. The analysis is done at a regional level as the limitations of state specific models in case of India are well documented in various papers (Bhat and Xavier, 1999; Sopher, 1980). The state specific models fail to appreciate the possible inter-regional variations within the state or similarities between neighbouring regions across states. In most of the micro and macro level studies these "pockets" which are at odds with the overall pattern of that region, are overlooked or not captured fully. The present study focuses on the state of Madhya Pradesh and attempts to examine the regional variation in terms of socio-economic conditions, status of women, family welfare programme and fertility and mortality outcomes. Further, the relative role of these three factors in explaining fertility and mortality has been studied through multivariate techniques.

## METHODS AND MATERIALS

### Data Sources

The basic data used for the present study has been gleaned from multiple sources, as the study is based on a wide array of information involving development, status of women, family welfare programme and certain demographic parameters of the state of Madhya Pradesh. The prime sources of these data are Census of India 1991, Centre for Monitoring of Indian Economy (CMIE) 1993 and National Family Health Survey-2 (NFHS-2) 1998-99 (IIPS 2000). The justification for using CMIE 1993 data is that one of the hypotheses of the paper was to test Dyson and Moore's (1983) assertion that the areas where rice cultivation is predominantly more, status of

women is also higher. The CMIE report of 2001 does not furnish any such data on agricultural production and therefore CMIE 1993 data has been used, which is the only source that provides area under rice cultivation at the district level. Though, the data used is that of the year 1993, but it should be remembered that the sampling frame of NFHS-2 (1998-99) was based on Census of India 1991 and hence CMIE data of 1993 was the only available source in this regard. Again as CMIE (1993) data had been used to show the extent of agricultural development, consequently to show the comparable non-agricultural development which is defined as “percent of male main workers in non-household industries; construction; mining and quarrying; and service sector”, using data of Census of India, 1991 seemed more appropriate rather than using data of Census 2001.

The district level data thus obtained from the Census and CMIE reports have been reclassified according to the NFHS regions giving due weightage to population size. The NFHS report does not provide regional estimates for all states and therefore districts have been clubbed together according to the NFHS sampling regions, which are geographic, in order to obtain estimates for the respective regions. In Madhya Pradesh there are seven regions (including Chattisgarh). The districts falling under each region are shown in Table 1. Since in Madhya Pradesh there are only seven regions, to explore the second objective, the regions of the major states of the country were taken into account to carry out the multivariate analysis (estimates for regions other than that of Madhya Pradesh are not shown here).

**Table 1: Name of the districts under each region of Madhya Pradesh**

Region 1 Chattisgarh	Bilaspur, Durg, Raipur, Rajendranagar, Raigarh, Surguja
Region 2 Vindhya	Panna, Rewa, Satna, Sidhi, Sahdol, Chattarpur, Tikamgarh
Region 3 Central	Raisen, Sagar, Damoh, Vidisha, Bhopal, Sehore
Region 4 Malwa Plateau	Dewas, Dhar, Indore, Jhabua, Ujjain, Rajgarh, Ratlam, Mandsur, Shajapur
Region 5 South Central	Mandla, Jabalpur, Seoni, Narsimhapur, Chhindwara, Balagahat
Region 6 South Western	Betul, Hosangabad, East Nimar, West Nimar
Region 7 Northern	Gwalior, Bhind, Moorena, Datia, Guna, Shivpuri

In total, we have considered 75 regions across the country, as the estimates of the regression coefficients based on only seven regions of Madhya Pradesh would not be stable.

An endeavour was also made to investigate the impact of different zones on demographic outcomes. The north-south dichotomy in the Indian context was first identified by Dyson and Moore (1983) who opined that kinship pattern favours greater female autonomy and lower fertility in the south and the reverse pattern exists in the north. Expecting regional variations in fertility, Malhotra *et al.* 1995 analyzed the pattern of patriarchy, development and social stratification accounting for the regional effect considering three regions north, south and east with the assumption that fertility will be high in north, low in the south and intermediate in the east. In the present study, all the four zones have been considered – north, south, east and west. The states of Rajasthan, Maharashtra and Gujarat have been included in the west zone while the south zone consists of Andhra Pradesh, Kerala, Tamil Nadu and Karnataka. Punjab, Haryana, Uttar Pradesh and Madhya Pradesh have been categorized as the north zone followed by West Bengal, Orissa and Assam in the east zone.

### Choice of Variables

The variation in socio-economic development has been studied through seven variables, viz. agricultural development, non-agricultural development, standard of living of the population, female literacy rate, children (6-14 years) attending school and non-Scheduled Caste/Scheduled Tribe (SC/ST) population. The status of women has been represented by the prevailing extent of patriarchy, which has been used as a proxy variable in this study. The measures of status of women which have been considered for this study are son preference, gender gap in school attendance, gender gap in immunization of children (12-23 months), women working for others, women exposed to mass media, area under rice cultivation and women's autonomy. The strength of the family welfare programme has been assessed through the extent of knowledge of women about the modern contraceptive methods, contraceptive prevalence rate (CPR), mothers receiving ante-natal care (ANC), deliveries assisted by health professionals, children (12-23 months) fully immunized and percent of villages

**Table 2: Detailed description of each variable considered for the study**

<i>S. No.</i>	<i>Variable Name</i>	<i>Variable Description</i>	<i>Source of Data</i>
<i>Socio-economic development</i>			
1	Agri	Value of major crop output per hectare (in Rupees)	CMIE, 1993
2	Non-Agri	Percent of male main workers in non-household industries; construction; mining and quarrying; and service sector [ <i>Main workers are defined as those who have worked for a major part of the year, i.e., more than six months or 183 days during the reference period. In the absence of GDP, data on industrial production at the district level and participation of workers in the above mentioned non-agricultural activities are considered as good indicators of non-agricultural development</i> ]	Census of India, 1991
3	SLI	Coefficient of variation in SLI expressed as percentage	NFHS-2, 1998-99
4	F-lit	Percent of literate women (15-49)	NFHS-2, 1998-99
5	Chsc	Percent of children aged 6-14 years attending school	NFHS-2, 1998-99
6	Nvmw	Percent of never married women in the age group 15-19 years	NFHS-2, 1998-99
7	Non SC/ST	Percent of ever-married women (15-49) who are neither SC nor ST (a proxy variable for Non SC/ST population).	NFHS-2, 1998-99
<i>Strength of Family Welfare Programme</i>			
8	FPK	Percent of ever-married women (15-49) having knowledge of any modern method of family planning	NFHS-2, 1998-99
9	CHIMM	Percent of children (12-23 months) fully immunized	NFHS-2, 1998-99
10	D_HP	Percent of deliveries assisted by trained health professionals	NFHS-2, 1998-99
11	CPR	Percent of currently married women using any modern method of contraception	NFHS-2, 1998-99
12	PHC/CHC/SC	Percent of villages having a PHC/CHC/SC within the village or within 5 km of the village	NFHS-2, 1998-99
<i>Patriarchy</i>			
13	Sonindex	This is an average value of two ratios. The first ratio is the percent of women with two children both daughters not desiring additional children to percent of women with two children both sons not desiring additional children. The second ratio is the proportion of women with three children, at least two of them daughters, not desiring additional children to percent of women with three children at least two of them being sons, not desiring additional children. Theoretically the index sometimes may be mathematically undefined as the denominator may be zero. However here we assume that the denominator will never be zero. It is quite a realistic assumption considering the sample size we have. Generally it is felt that if son preference is high, then desire to have more children will be higher among women having daughters only or a majority of their children being daughters. Therefore, a lower value of this index will reflect a greater extent of son preference.	NFHS-2, 1998-99
14	G-schatt	Ratio of female to male children (6-14) attending school	NFHS-2, 1998-99
15	G-imm	Ratio of female to male children (12-23 months) fully immunized	NFHS-2, 1998-99
16	W_others	Percent of women (15-49) working for someone else	NFHS-2, 1998-99
17	W_media	Percent of women (15-49) exposed to any mass media (newspaper, radio, television or cinema)	NFHS-2, 1998-99
18	Area_rice	Percent of net sown area under rice cultivation	
19	W_auto	Percent of women having decision making power at least in purchasing jewellery, or spending money, or obtaining own health care or if they are allowed to keep money aside	CMIE, 1993 NFHS-2, 1998-99
<i>Demographic Outcomes</i>			
20	Standardized CEB	Standardized value of mean number of children ever born to currently married women (15-49) [ <i>The standardized mean CEB for a region has been calculated by considering the distribution of mothers by age for the country as a whole as the standard</i> ]	NFHS-2, 1998-99
21	Norm	Percent of currently married women (15-49) with two children not desiring any more children.	NFHS-2, 1998-99
22	Child Loss	Percent of women having experienced at least one child loss	
23	Birth order	Percent of birth of order 3 and above	NFHS-2, 1998-99 NFHS-2, 1998-99

having health facility within the village or within five kilometers of the village. The variables that have been considered under demographic outcomes are standardized children ever born (CEB), percent of birth of order 3 and above and percent of women who have experienced at least one child loss. The definitions of the variables under each of the three dimensions are given in table 2.

## RESULTS AND DISCUSSION

### Socio-economic Development

The state of Madhya Pradesh exhibits a diverse socio-cultural milieu conspicuous by the presence of heterogeneity in the developmental indicators across its different regions. Table 3 presents a brief overview of the selected indicators under socio-economic development for all the regions of the state. For the present analysis, agricultural development has been measured by the value of major crop output per hectare in rupees (CMIE, 1993). The state with 11 agro-climatic zones and five crop zones with distinct soil types depict marked regional differences in the productivity of different crops. The Northern region of the state with a combination of red, yellow, medium black and skeletal (medium/light) soils is much more developed than its counterparts. The mean agricultural output of major crops per hectare in this rice zone is Rs. 2801 whereas the same value for the South Central and the Malwa Plateau region varies between Rs. 2490 to Rs. 2439 respectively. The Central Plateau has witnessed significant livestock development, as they are potential milk shed areas. However it should be kept in mind that per hectare output of major crops in Madhya Pradesh is very low compared to the other parts of the country. Non-agricultural development is relatively less due to

agricultural predominance and the absence of coastal lines, which enhances greater international accessibility through sea and ocean routes. In the Central region, 39 percent of the workers are from non-agricultural sector. In the other regions it varies from as low as 20 percent in the Chattisgarh Plains to a modest of 26 percent in the Malwa Plateau belt.

The inequality in standard of living is quite high in all the regions as is evident from the coefficient of variation, which ranges from 32 to 41, the highest being observed in the South Central region (comprising of the districts of Mandla, Jabalpur, Seoni, Narsimhapur, Chhindwara and Balaghat). The greater variation in SLI implies greater extent of poverty in most of these areas. Looking into the regional performance of the literacy profile, the situation is not satisfactory even though the state has experienced an increase in literacy rates. Educating women results in improved productivity, income and economic development as well as a better quality of life, notably a healthier and better-nourished population (World Bank 2001). Among the seven regions of the state, the Central Region seems to be better placed where 44 percent of the women aged 15-49 are literate. In rest of the regions it varies from as low as 22 percent in the Vindhya region to 34 percent in the South Central region. According to Census of India, 2001, the state with an overall female literacy of 51 percent is close to the national average of 54 percent but is significantly disproportionate as the same proportion is 43 and 71 percent in case of rural and urban areas respectively. The school attendance of children aged 6-14 years, considered as one of the most important indicators of social development, shows marked regional discrepancies in case of Madhya Pradesh. It is lowest in the Malwa Plateau (68 percent) and highest in the Central region (82 percent).

The median age at marriage for the state is

**Table 3: Level of socio-economic development in different regions of Madhya Pradesh**

<i>Regions</i>	<i>Agricultural development</i>	<i>Non- agricultural development</i>	<i>C.V. in SLI*</i>	<i>Female literacy rate</i>	<i>Children attending school</i>	<i>Never married women</i>	<i>% of non SC/ST population</i>
Chattisgarh	1876.1	20.0	36.1	31.5	78.8	65.0	50.1
Vindhya	1619.6	22.9	38.7	21.7	79.4	48.6	59.8
Central	2140.5	38.8	37.1	43.8	81.7	55.6	72.3
Malwa Plateau	2439.0	26.1	32.4	32.9	67.7	55.8	67.1
South Central	2489.8	24.0	40.9	34.2	75.0	67.5	60.2
South Western	2236.2	20.2	34.1	32.1	69.4	67.6	62.1
Northern	2801.5	25.8	35.1	28.9	78.3	47.6	77.9

Coefficient of Variation in Standard of Living Index

14.7 years, which is lower by 1.7 points from the national average of 16.4 years. Proportion of never married women in the age group 15-19 varies from 68 percent in the South Western region to 48 percent in the Northern region. In Madhya Pradesh, nearly half of the women are married in this age group, which contributes about 32 percent of the total fertility. An early age at marriage is likely to have a negative effect on empowerment by virtually terminating women's access to sources of empowerment such as formal education (Mason 1986; Mason and Taj 1987) and to the resources of their natal families, including in some cases their emotional support. Another indicator of social development is the proportion of SC/ST population to total population. The share of this socially deprived group has a relatively higher concentration in all the regions of the state with the Southern part accounting for as high as 40 percent.

#### Status of Women

The levels and patterns of female autonomy vary considerably over the regions of Madhya Pradesh. In this section we have discussed at length the variables considered to represent patriarchy, which is taken as a proxy to represent status of women. Table 4 depicts the values of all these selected indicators. It is expected that the regions where patriarchy is stronger gender discrimination towards females will be more resulting in low status of women. In the Indian society, a strong preference for sons has been found to be pervasive affecting both attitudes and behaviour with respect to children (Arnold et al., 1998; Basu, 1989; Dasgupta, 1987; Kishor, 1995; Murthi et al., 1995; Nag, 1991; Parsuraman et al., 1999). A preference for sons reflects

women's acceptance of gender roles that ascribe a higher status to males than females. In this paper, son preference, a direct measure of patriarchy, has been measured by means of an index (shown in Table 2). The results depict that preference for sons is highest in the Vindhya region followed by the Chattisgarh Plains comprising of Bilaspur, Durg, Raipur, Rajendranagar, Raigarh and Surguja. This greater preference for male child gave rise to a skewed juvenile sex ratio (0-6), which is another important indicator of gender discrimination at the early ages of life. From 1961 to 1991, sex ratios for children under age 10 became more masculine all across India (Bhat, 1989; Dasgupta and Bhat, 1997; Desai, 1994; Miller, 1981; Parasuraman and Roy, 1991). In most of the regions of Madhya Pradesh (Chattisgarh, Vindhya, Central, Malwa and South Central region) sex ratio favours the males and is most imbalanced in the Northern region where 190 girls were found less per 1000 boys.

Gap in school attendance further measures the favoritism shown in case of male child by enrolling them for formal education in schools. In case of Madhya Pradesh, the gap is more or less consistent in all the regions with about 83 girls attending school for every 100 boys in the Northern region, followed by 85 girls in the Malwa Plateau, 87 girls in the South Central region, 88 girls in the Vindhya and Central region, and 89 girls in the Chattisgarh and South Western region respectively. Kishor and Gupta (2004) in their paper using NFHS-2 (1998-99) data at the all India level suggested that almost all women believe that girls should receive some education with a majority believing that boys and girls should get similar levels of education. However, considerable amount of gender discrimination in favour of

**Table 4: Performance of the variables considered under the dimension of status of women in different regions of Madhya Pradesh**

<i>Regions</i>	<i>Son preference index</i>	<i>Sex ratio</i>	<i>Gap in school attendance</i>	<i>Gap in immunization</i>	<i>Women working for others</i>	<i>Women exposed to media</i>	<i>Area under rice cultivation</i>	<i>Women's autonomy</i>	<i>Decision making power in spending money</i>	<i>Decision making power in obtaining health care</i>
Chattisgarh	76.4	93.9	88.9	63.6	29.6	58.3	78.43	64.8	35.3	27.2
Vindhya	59.5	89.0	87.8	60.2	31.3	34.7	26.15	45.5	18.1	09.9
Central	84.2	95.4	88.2	41.8	27.7	66.2	04.08	67.0	33.5	22.0
Malwa Plateau	91.0	90.3	85.4	68.2	25.8	64.8	00.73	56.5	35.3	21.8
South Central	79.2	96.3	86.7	57.2	33.3	53.4	28.41	64.9	32.1	22.9
South Western	89.4	100.5	89.2	53.4	26.6	60.0	04.97	66.1	40.1	29.2
Northern	77.0	81.5	83.1	32.8	14.9	46.9	02.19	55.4	39.7	15.8

males prevails in the status of immunization, especially between the Northern and the Malwa Plateau region of the state. The situation is most acute in the Northern and Central region where only 33 and 42 girls respectively are immunized per 100 boys. In the Malwa Plateau region it is 68 girls, followed by 64 girls per 100 boys in the Chattisgarh region. Gender differences in health care between boys and girls are the direct consequence of discrimination against females in seeking health care. Studies across India have found that boys are much more likely than girls to be taken to a health facility when sick (Govindaswamy and Ramesh, 1996; Kishor, 1995) and are also likely to have higher immunization rates than girls.

NFHS had asked a number of questions in order to study the extent of female autonomy. An index (given in Table 2) has been constructed in order to measure the level of women's autonomy in the different regions of Madhya Pradesh using a few of these questions. The value of the index is comparatively higher in the South Western region (66 percent), followed by South Central and Chattisgarh region (each with 65 percent). The Vindhya region shows the lowest value of the index. The situation is also not favourable in the other two regions. Two components of female autonomy viz. decision making power about spending money and obtaining healthcare have been examined independently considering the importance of these two components. The decision making power in obtaining healthcare is very low in all the parts of the state. It varies from as low as 10 percent in the Vindhya region to 29 percent in the South Western region. Decision making power about spending money is again the least in the Vindhya region (18 percent) and highest in the South Western region (40 percent). Again, employment, particularly for cash and in non-traditional occupations, potentially empowers women by providing financial independence, alternative sources of social identity, and expose to power structures independent of kin networks (Dixon Mueller, 1993). Another aspect of women's employment as a potential source of empowerment is the extent to which households are dependent on women's earnings. The proportion of women working for others is very low in all the regions of the state, the lowest being in the Northern region with only 15 percent. In other regions, only one-third of the women folk are working, with the highest being 33 percent in

the South Central region. Female labour force participation is expected to provide economic security and social mobility, which in turn, improves the status of women in the family. Consequently, in many studies, area under rice cultivation has been considered as an indicator of female autonomy. Area under rice cultivation is the lowest in the Malwa Plateau followed by the Northern, Central and South Western region.

A large number of women in Madhya Pradesh are either illiterate or have only limited education. In such a situation, informal channels such as the mass media can be an important source for exposing women to the outside world and building awareness. In order to assess the reach of the mass media, NFHS had asked the respondents whether they read newspaper at least once a week, listen to radio at least once a week, watch television at least once a week and go to cinema hall at least once in a month. From these questions, an index of exposure to mass media has been calculated, which is percentage of women exposed to any mass media. At the national level 60 percent of women are reported to have regular exposure to mass media. Except in the Vindhya and Northern region of the state, where the percentage is as low as 35 and 47 respectively, the women residing in the other regions are relatively more frequently exposed to mass media.

### **Family Welfare Programme**

Socio-economic development and family planning should be seen as complementary and mutually reinforcing processes (Visaria, 1972). Government of India was the first in the global context to initiate a comprehensive family planning programme in 1952, which was later expanded to encompass maternal and child health, family welfare and nutrition. In keeping with the democratic traditions of the country, the family welfare programme seeks to promote on a voluntary basis, responsible and Planned Parenthood, through independent choice of family planning methods best suited to the acceptors. The strength of this programme is very important in translating plans into actions and further to achieve the desired level of development at par with the demographically and socially advanced states of the country. Table 5 exhibits the performance of the key indicators considered under the programme variable. More than half of the villages in Madhya Pradesh have a Primary Health Centre/

**Table 5: Status of family welfare programme in different regions of Madhya Pradesh**

<i>Regions</i>	<i>Antenatal care</i>	<i>Deliveries assisted by health professionals</i>	<i>Percent of children fully immunized</i>	<i>Percent of villages having a PHC/CHC/SC</i>	<i>Contraceptive Prevalence Rate</i>
Chattisgarh	33.6	32.2	20.0	48.4	42.3
Vindhya	19.9	15.7	08.4	50.0	34.5
Central	28.1	33.8	18.4	56.7	43.3
Malwa Plateau	32.6	38.0	28.6	33.3	52.1
South Central	26.8	23.5	17.6	48.8	47.2
South Western	33.7	27.6	24.5	51.7	44.9
Northern	19.7	36.2	15.7	46.2	34.2

Community Health Centre/Sub-Centre (PHC/CHC/SC) within 5 km, the better performing regions being the Vindhya, Central and South Western region. However the proportion is the lowest in the Malwa Plateau area, where only 33 percent villages have such a facility.

Perhaps the most important proximate determinant of fertility is the level of contraceptive use. In India as a whole, 43 percent of the currently married women in the age group 15-49 or their husbands have reported to use any modern contraception at the time of the survey. The value of the same varies from 34 percent in the Northern region to 52 percent in the Malwa Plateau region while the state average is same as the national average. The Safe Motherhood Initiative proclaims that all pregnant women must receive basic, professional antenatal care (ANC) (Harrison, 1990). ANC refers to pregnancy related health care provided by a doctor or a health worker in a medical facility or at home. The Reproductive and Child Health Programme recommends that as part of antenatal care, women must receive two doses of tetanus toxoide vaccine, adequate amounts of iron and folic acid tablets or syrup to prevent and treat anaemia, and at least three antenatal check-ups that include blood pressure checks and other procedures to detect pregnancy complications (Ministry of Health and Family Welfare, 1997, 1998). But still there exists a wide regional variation in the level of antenatal care in Madhya Pradesh, the lowest being observed in the Vindhya and Northern region (20 percent each) and the highest being reported in the Chattisgarh plains and the South Western region (34 percent respectively), which is about 10 points lower than the national average of 44 percent. This infers that the service of antenatal care is still not availed by the women.

From the service delivery point of view, it is very important to have an idea about the propor-

tion of deliveries assisted by trained health professionals. This indicator, which pertains to care during delivery, is important to understand the extent of progress achieved towards meeting the safe motherhood goals. For India as a whole, health professionals assist only 42 percent of deliveries while the same figure for the state is as low as 30 percent. The regional situation reveals that in the Vindhya region, health professionals assist only a meager 16 percent of the total deliveries. The situation is somewhat better in the Malwa Plateau region where health professionals assist 38 percent of the deliveries. For the other regions the figure varies between 23 to 34 percent, well below the national average. The vaccination of children against six serious but preventable diseases (tuberculosis, diphtheria, pertussis, tetanus, poliomyelitis and measles) has been a cornerstone of the childcare system in India. The immunization data shows the percentage of fully immunized children among those who were aged 12-23 months at the time of the NFHS-2 survey. Children who had BCG vaccination, three polio drops, three DPT and one Measles vaccination at any time before the survey have been taken to be fully immunized. In the state of Madhya Pradesh only 22 percent of the children are fully immunized. The situation is equally poor in all the regions of the state, with the lowest being eight percent in the Vindhya region and the subsequent highest of 29 percent in the Malwa Plateau.

### Demographic Variables

In Madhya Pradesh, between 1981 and 2001, both fertility and mortality have registered a gradual decline. The crude birth rate has declined from 31.4 per 1000 population in 2000 to 30.8 in 2001 (SRS, 2001). The crude death rate is also showing a declining trend (10.3 per 1000

population in 2000 to 10.0 in 2001). In 2001, the Sample Registration System estimated an infant mortality rate of 86 per 1000 live births in the state compared to 66 for the country as a whole. However, there exist marked rural-urban differentials in the same rate (93 and 52 per 1000 live births respectively). In the present study, children ever born (CEB) has been considered as one of the measures of fertility, the other being the birth order of three and above. In order to make the regional estimates comparable and check the effect of age distribution, the CEB have been standardized considering the population of India as standard. The standardized figure of CEB varies from 3.39 in the Vindhya region to 2.82 in the Chattisgarh Plains (Table 6). The data on birth order of three and above have been considered to examine the regional variation in reproduction. In the Central region of the state, more than 40 percent of the total births were of third order and above, though the standardized CEB is 2.91. Considering the mortality situation, child mortality (138 per 1000 live births) has been found to be one of the highest, which substantiate the fact that fertility is also very high. In this paper, child loss has been defined as the death of a child before attaining his/her fifth birthday, i.e., under ages five. From table 6 it is evident that the percent of women who have experienced at least one child loss is highest in the Vindhya region (25 percent) and lowest in the Central region (16 percent).

### Interrelationships among the Study Variables

In order to find out the relative role of each of the factors in explaining fertility and mortality, a multi-variate regression analysis has been performed considering all the 75 regions of the 15 major states of the country. Though, it would have been desirable to do the analysis based only on Madhya Pradesh, but since there are only seven regions in the state, it was not possible to carry

out any multivariate techniques to find out the relative importance of the different factors in explaining fertility and mortality. The correlation matrix (not shown) shows that there exists a considerable degree of interrelationship among the variables included in the analysis. For example, agricultural development, non-agricultural development and female literacy are highly and positively related signifying that the areas which are better developed in one aspect are also relatively more developed in other aspects. There also exists a strong positive association between socio-economic development and the strength of family welfare programme. On the other hand, the status of women and the strength of the family welfare programme are positively related, implying that an improvement in the status of women through access to better health care, educational facilities, labour force participation and exposure to mass media is positively associated with an improvement in the family welfare programme. It has been observed that where socio-economic development and status of women is low, fertility and mortality are relatively high.

Since considerable multi-collinearity exists among the variables considered under each dimension of socio-economic development, status of women and strength of family welfare programme, a factor analysis was performed to extract the dominant factors in each of them. One factor has been retained from the dimension of socio-economic development based on Kaiser's criterion of eigen-value to be greater than unity and proportion of total variance explained. The retained factor from the dimension of socio-economic development accounted for 60 percent of the inter-regional variation in 75 regions over the eight selected indicators. Agricultural and non-agricultural development, children attending school and female literacy rate have shown higher factor loadings. The least value of communalities was 0.5 in case of percent non SC/ST, which

**Table 6: Level of demographic situation in different regions of Madhya Pradesh**

<i>Regions</i>	<i>Child loss (%)</i>	<i>Children ever born</i>	<i>Small family norm (%)</i>	<i>Birth of order 3 and above (%)</i>
Chattisgarh	22.2	2.82	29.1	21.5
Vindhya	24.6	3.39	36.2	24.0
Central	16.2	2.91	32.8	41.3
Malwa Plateau	19.3	2.85	28.3	33.9
South Central	21.7	2.92	29.5	24.3
South Western	21.1	3.21	34.3	24.3
Northern	20.7	3.19	37.1	33.1

denotes the proportion of variance of each indicator being captured by the retained factors. For all other indicators, the observed communality was more than 0.7. Though, two factors could be retained from the dimension of strength of the family welfare programme based on Kaiser's criterion of eigen-value greater than one, only one factor was retained in the final regression analysis which explained 66 percent of the inter-regional variations over the five selected indicators. The second factor that accounted for 21 percent of variance and had a higher factor loading for proportion of villages having a PHC/CHC/SC was not included in the final multivariate analysis. These two factors together accounted for 87 percent of variation in the dimension of family welfare programme.

The variables included in the category of patriarchy (the proxy for status of women) could be represented by two factors. The first factor had a higher factor loading for the gap in school attendance, women exposed to media and women's autonomy. Higher the value of this factor, higher is the status of women. The second factor had higher weightage for son preference and women working for others. Area under rice cultivation did not figure in any one of the factors, which indicates that this variable is quite independent of the other variables considered to represent patriarchy. This contradicts the belief of some scholars that fertility is low in rice growing areas because females enjoy higher autonomy.

These three main factors in each direction were used in a multivariate regression analysis in order to find out their relative importance in

explaining fertility and mortality, which were used as dependent variables. As it is well accepted that fertility and mortality are interrelated, therefore, child loss has been taken as an independent variable in the regression equation of children ever born and similarly children ever born was considered as an independent variable in the regression equation of child loss. The effect of east, west and north zone has been observed by taking the south zone as the reference category. From table 7, it is evident that among the three factors, only the programme factor has come out significant in reducing the number of CEB. Women residing in areas with a strong family welfare programme are likely to have lower fertility compared to those in areas with a weak programme effect. Neither socio-economic development nor the status of women was seen to exert a similar influence on fertility. The other variables, which have come out as significant are, the percent of women who have experienced child loss, the north zone dummy along with the constant. The coefficients of north zone and the constant are positive. It is expected that those women who experience more child loss will go for higher order births in order to achieve their desired family size. Hence child loss significantly increases CEB. Compared to the south, fertility was found to be higher in other zones even after controlling for other variables. The interaction between socio-economic development and programme strength brings to light that in areas with a strong programme, the level of development and fertility are negatively related.

The dominant factor, which has come out significant in reducing child loss, is socio-econo-

**Table 7: Results of regression analysis of Children Ever Born (CEB) and Child loss**

<i>Constant and variables</i>	<i>CEB</i>	<i>Constant and variables</i>	<i>Child loss</i>
Constant	2.20*	Constant	6.26
Socio-Economic Development (SED)	-0.14	Socio-Economic Development (SED)	-0.55*
Programme Variable (PROG)	-0.53*	Programme Variable (PROG)	0.44**
Status of Women (STATUS)	-0.11	Status of Women (STATUS)	-0.18
NORTH Zone	0.029*	NORTH	0.30*
EAST Zone	0.06	EAST	-0.18
WEST Zone	0.07	WEST	0.04
SED*PROG	-0.03	SED*PROG	0.07
SED*STATUS	-0.07	SED*STATUS	-0.16
PROG*STATUS	-0.04	PROG*STATUS	-0.08
SED*PROG*STATUS	0.04	SED*PROG*STATUS	-0.06
Child loss	0.19**	Children Ever Born (CEB)	0.43*
Standard error of the estimate	0.173	Standard error of the estimate	1.30
R Square	0.87	R Square	0.71
Adjusted R Square	0.85	Adjusted R Square	0.66

\*p < .001, \*\* p < .05

mic development. Socio-economic development initiates hygiene and health practices that reduce child loss. The analysis shows that the programme factor significantly increases child loss. This may be due to the fact that among the variables included in the factor of programme strength only children immunized, mother's receiving antenatal care and deliveries assisted by health professionals reduces child mortality to some extent. As the availability of health care facility was not included in the programme factor we later incorporated the same in the analysis considering the importance of this variable, but even then there was no significant difference in the results. It may be possible that where health care facilities are available, reporting error may be less. It is well recognized that child mortality is triggered more by diseases like diarrhea, cholera and other water borne diseases in most parts of the country. Another factor that has come out significant in reducing child death is CEB. The interaction between status of women and programme strength was negative, which signifies that the effect of the programme strength tends to reduce in areas where status of women is better. Even after controlling for other variables, child loss was significantly more in the north zone.

#### SUMMARY AND CONCLUSION

The study shows that there exist conspicuous regional variations in socio-economic development, cultural traits and the strength of family welfare programme in the state of Madhya Pradesh. In most of the aspects, the Northern region of the state is falling behind compared to the overall state average while Chattisgarh Plains is a relatively better performing region. It is well established that socio-economic development, status of women and strength of the family welfare programme are highly correlated. Areas where socio-economic development is high, the strength of the family welfare programme is also more and consequently the status of women is better. Area under rice cultivation is independent of the other variables popularly used to represent status of women in the society, which negates the popular opinion that status of women is higher in regions where area under rice cultivation is more. Though the effect of family welfare programme in reducing fertility is higher than socio-economic development, the latter exerts more influence in reducing child mortality. The

factor representing status of women does not have that much of an effect in reducing fertility or child mortality as compared to the factor of socio-economic development and the strength of programme. Therefore, our study suggests that both socio-economic development and the strength of family welfare programme should go hand in hand in bringing about further reduction in the fertility and mortality situation in Madhya Pradesh. Thus, from the policy point of view, utmost care should be taken in formulating state level policies giving precedence to performance of indicators at the district/region level so as to ensure a balanced regional development in the state and subsequently achieve the socio-demographic goals laid down in the National Population Policy 2001.

The regional level analysis of demographic data vindicates the further need for surveys and research capturing the area specific models in order to make an effective strategy to bring about balanced development in each and every pocket of habitation. Even within a region the demographic parameters vary significantly which reveals the fact that socio-economic and cultural parameters within these regions are responsible for such variations even while the mode of production remains the same. Though blocks are the lowest administrative and planning unit in the governmental structure, still for effective policy formulation and implementation, villages should be considered as the unit for micro level planning as they exhibit more or less homogeneous demographic and developmental indicators. Therefore, in order to study fertility behaviour, mortality patterns and level of family planning acceptance in a region under demographic probe, it is imperative to adopt a holistic approach to understand the dynamics of all these forces that act in tandem.

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